Faculty of Agricultural and Nutrional Sciences

Christian-Albrechts-Universität of Kiel
Institute of Animal Breeding and Husbandry

PDS (Postpartum Dysgalactia Syndrome) in sows: application of decision tree technique for data analysis

I. Gerjets[1], I. Traulsen[1], K. Reiners[2], N. Kemper[1]

[1]Institute of Animal Breeding and Husbandry, CAU Kiel

[2]PIC Germany GmbH, Schleswig

EAAP 2010, Heraklion, Crete Island, Greece

Introduction

PDS (Postpartum Dysgalactia Syndrome)

⇨ fever and inflammation of the mammary glands

⇨ multifactorial disease

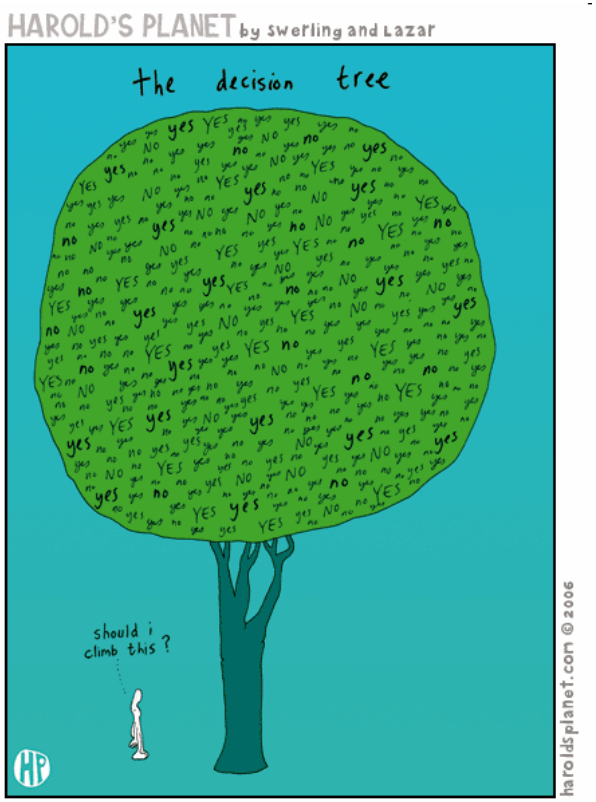
⇨ economically very important

consequences in sows	consequences in piglets
reproductivity ⇩	mortality ⇧
conception disorders ⇧	runt piglets ⇧
litter sizes ⇩	intake of colostrum ⇩
piglet losses a.p. ⇧	weight gain ⇩

Decision tree

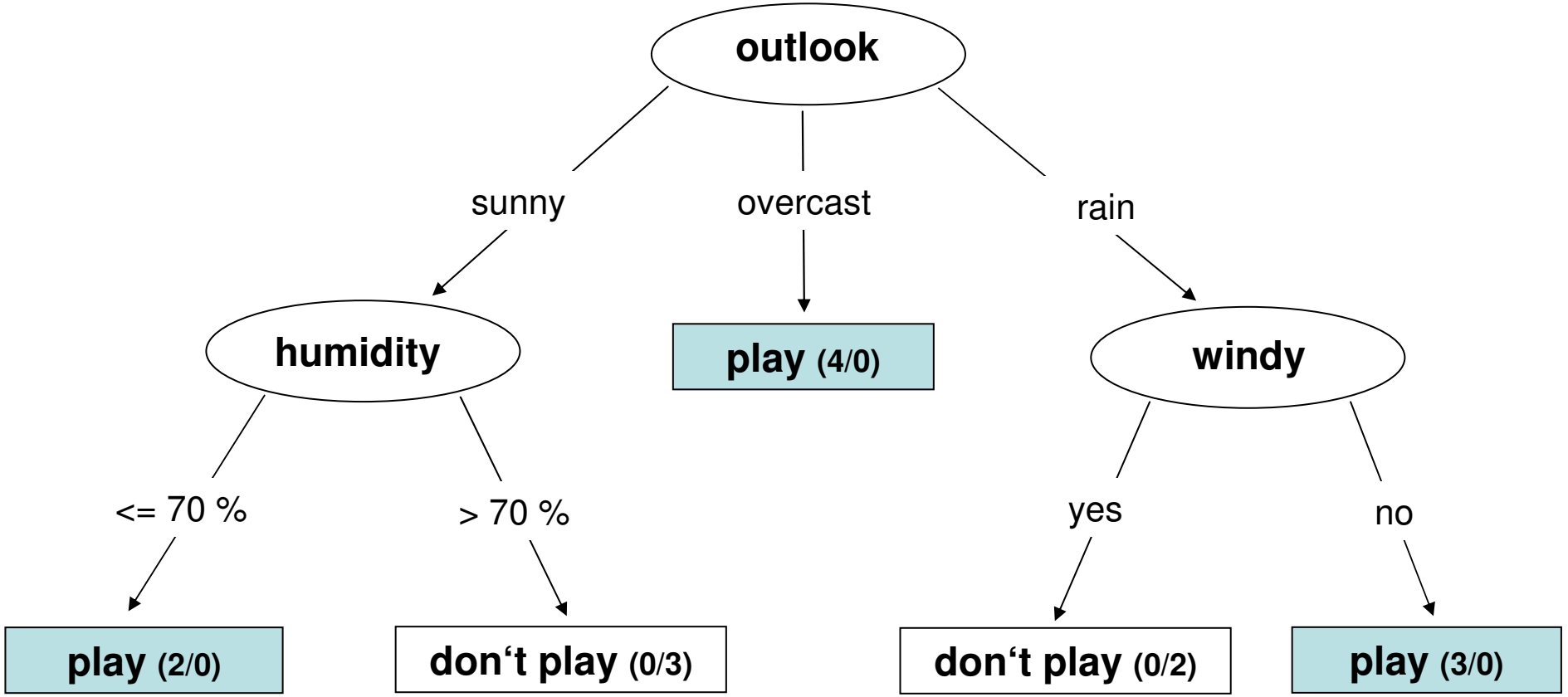
- ⇨ common method used in data mining
- ⇨ process of extracting unknown

  patterns from large database
- ⇨ decision support tool



Decision tree - example

Depending variable: Playing tennis?



Mitchell T.M., 1997

Aim of the study

Application of decision tree technique to parameters associated with PDS-infected sows

Data set

Number of milk samples (n=2007)

farm	A	B	C	D	E	F	
PDS+	501	15	1	323	20	167	**1027**
PDS-	498	13	1	276	25	167	**980**
	999	**28**	**2**	**599**	**45**	**334**	

Material and methods

Preparation of the milk samples

- ⇨ **bacteriological analysis with different culture media and API identification systems**
- ⇨ **molecular techniques (PCR)**

Material and methods

Statistical analysis

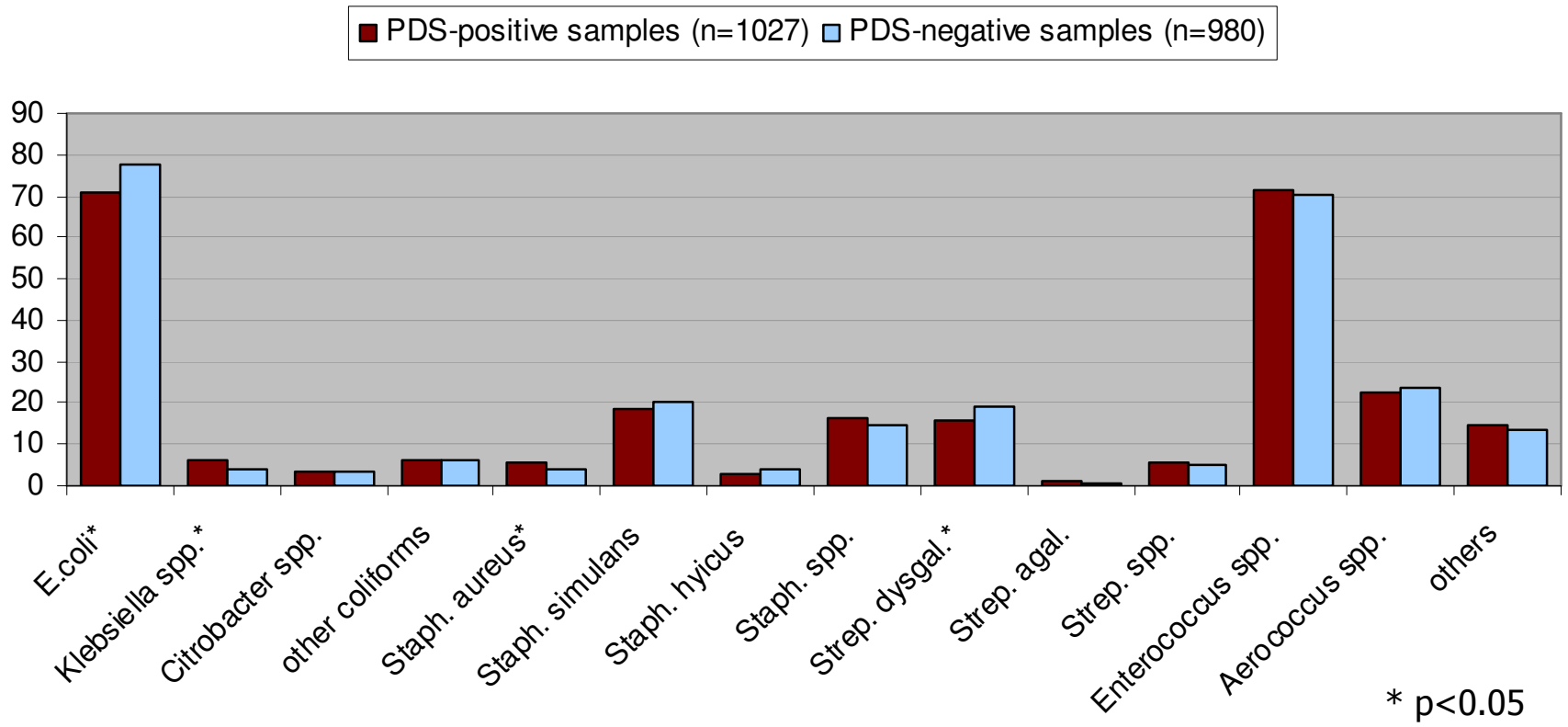
1. **PDS = isolated pathogens**
2. **PDS = parity of the sow, breed, piglets born alive, birth induction, birth intervention**

⇨ **top-down algorithm (C4.5 decision tree classifier / WEKA)**

⇨ **logistic regression (proc logistic / SAS 9.1)**

Results

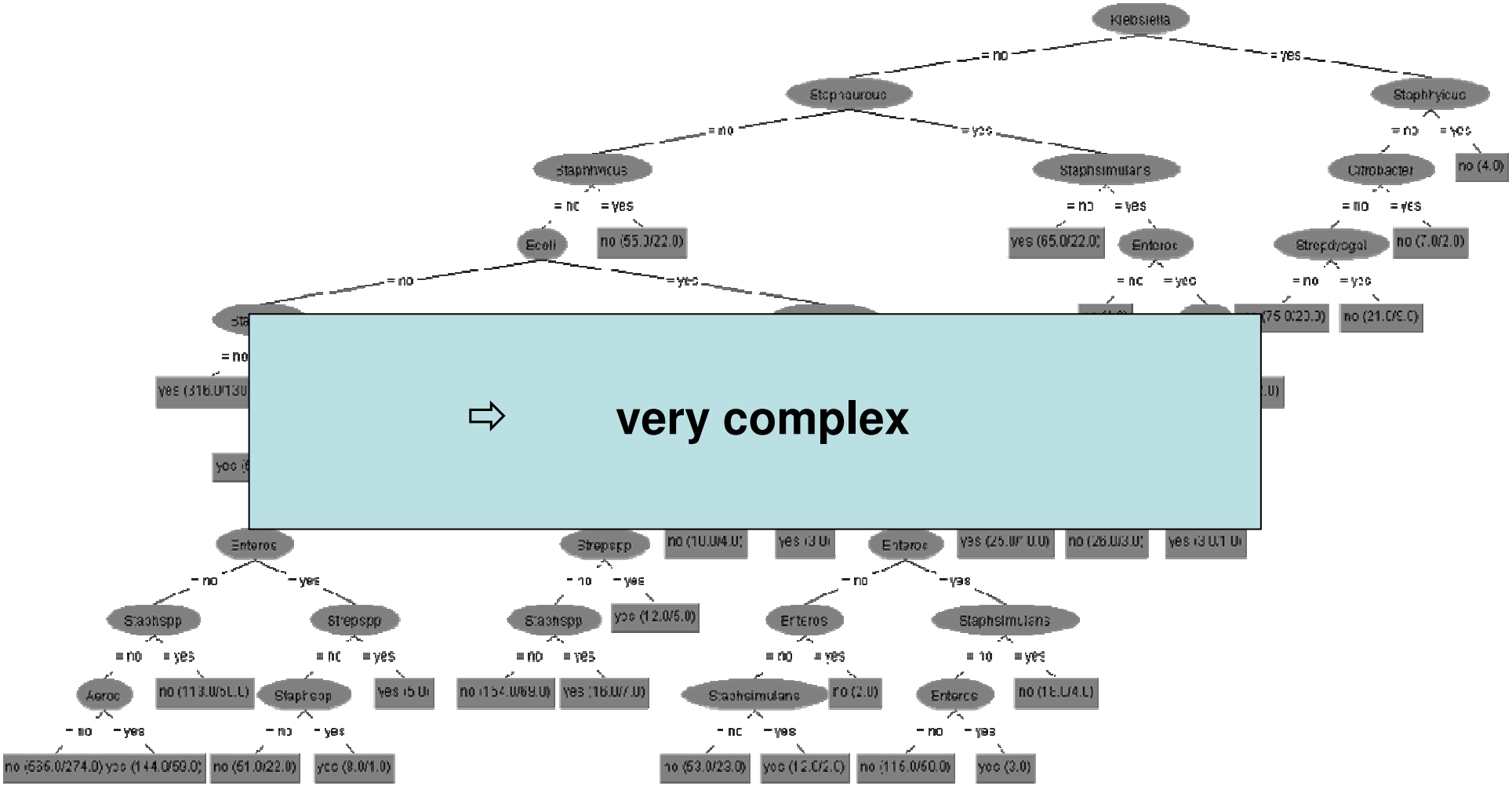
Bacteriological findings (in %)



⇨ **no differences in pathogen spectrum**

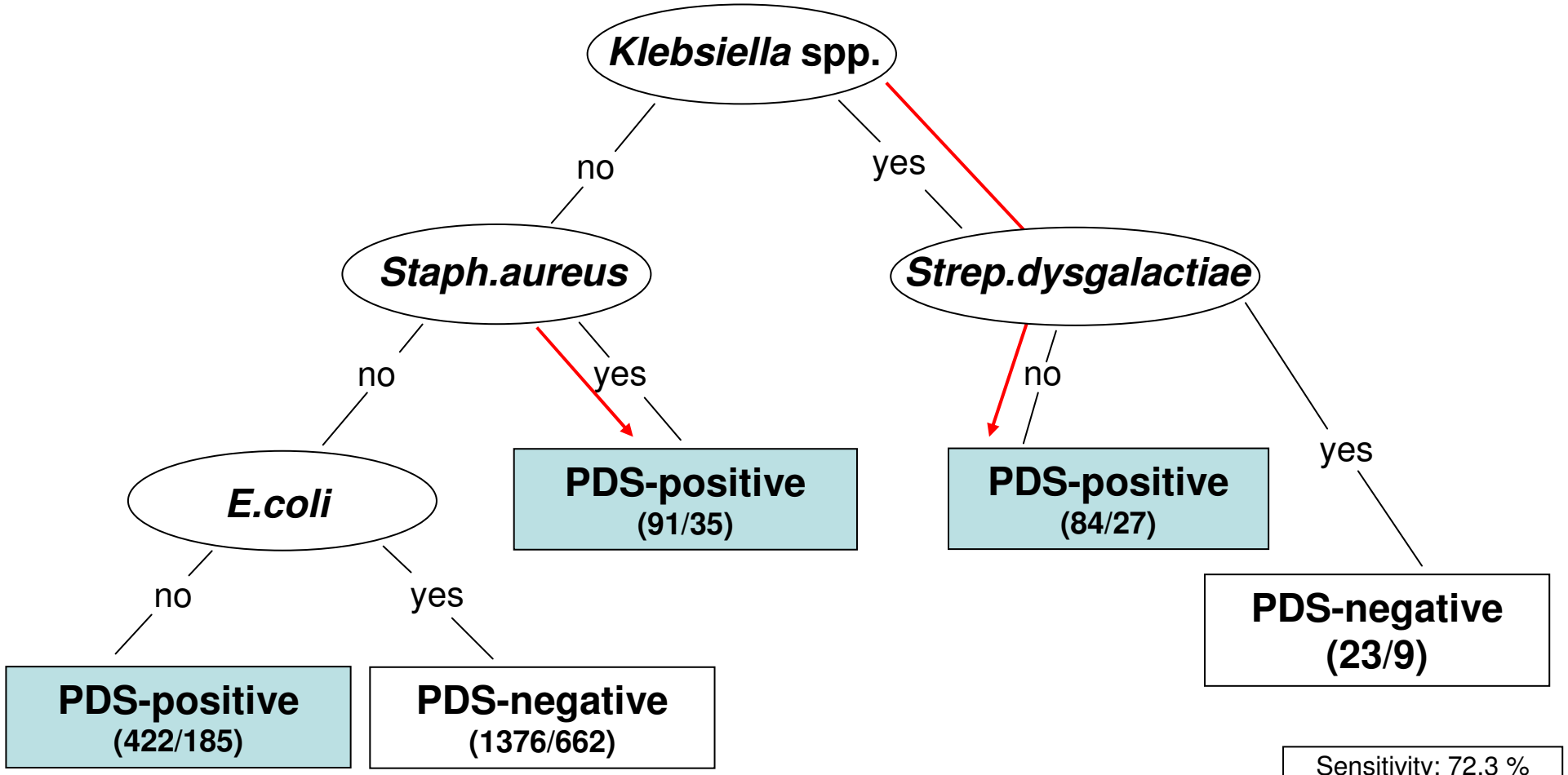
Results

Looking for patterns in pathogen spectrum



Results

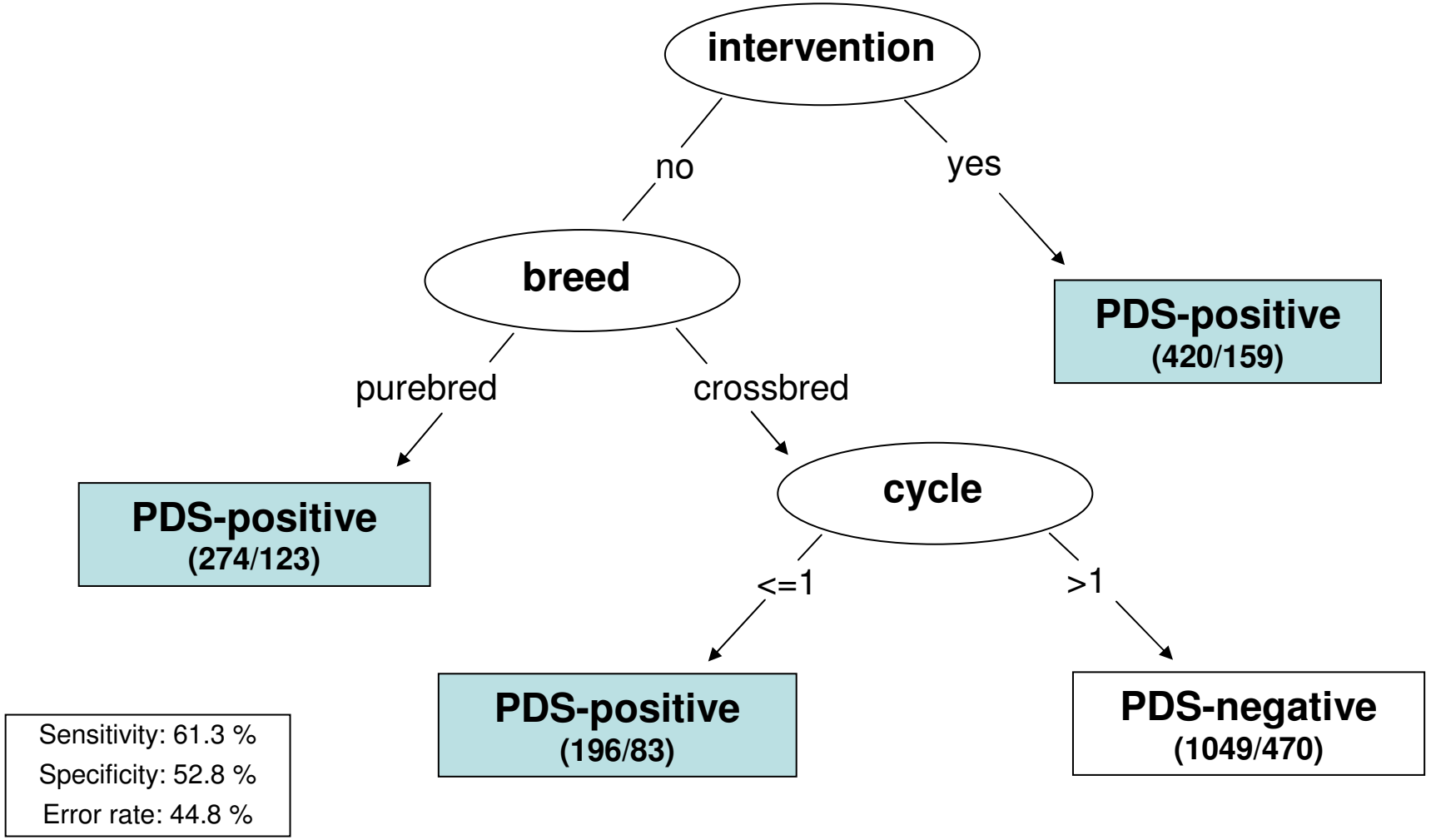
Looking for patterns in significant pathogens



Sensitivity: 72.3 %
Specificity: 33.7 %
Error rate: 48.9 %

Results

Looking for patterns in significant parameters for PDS



Results

Association rules

1. birth intervention
2. purebred
3. crossbred + primiparous

Results

Confirmation of the risk factors with logistic regression

Effect		OR	95% CI	p-value
parity	<= 1	1.48[a]	1.13 – 1.94	0.0051
	2 - 3	0.95[b]	0.78 – 1.16	
	> 3	1	-	
piglets born alive	<= 11	0.76[a]	0.61 – 0.95	0.0439
	12 – 13	0.83[a]	0.66 – 1.04	
	> 13	1	-	
breed	Landrace	1.43[a]	1.03 – 1.98	0.0205
	Large White	1.36[a]	1.01 – 1.85	
	crossbred	1	-	
intervention	No	0.54	0.43 – 0.68	<.0001
	Yes	1	-	

Conclusions

- ⇨ first time tree modeling was used to identify decision parameters for PDS
- ⇨ no specific pattern in the identified pathogen spectrum detectable
- ⇨ main risk factors and their relations were illustrated
- ⇨ decision tree approach and logistic regression with same results

PIC Deutschland GmbH

Faculty of Agricultural and Nutrional Sciences

Christian-Albrechts-Universität of Kiel
Institute of Animal Breeding and Husbandry

PDS in sows:
Application of decision tree technique for data analysis

I. Gerjets, I. Traulsen, K. Reiners, N. Kemper

This study is part of the FUGATO-plus-project ‚geMMA' and is funded by the Federal Ministry of Education and Research (BMBF).

Thanks for your interest!

Evaluation methods

Evaluation parameters	Formula
Classification accuracy	TP + TN /(TN + FP + FN + TP) * 100
Sensitivity	TP /(TP + FN) * 100
Specificity	TN /(TN + FP) * 100
Error rate	FP /(FP + TP) * 100